North Central Region Wausau Area
ITS Benefit/Cost Analysis Final Report

prepared for
Wisconsin Department of Transportation

prepared by
SRF Consulting Group, Inc.

in conjunction with
Cambridge Systematics, Inc.

August 2009

WISCONSIN DEPARTMENT OF TRANSPORTATION

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1.0 Introduction and Background

1.1 PROJECT OBJECTIVES

The objective of this project was to complete a moderately-detailed, planning-level analysis of the benefits of deploying selected Intelligent Transportation Systems (ITS) elements in the Wisconsin Department of Transportation's (WisDOT) North Central Region in the Wausau area of Marathon County. An ITS deployment consistent with the recommendations of the WisDOT Traffic Operations Infrastructure Plan (TOIP) has been proposed in the Wausau region. The ITS elements currently being discussed for possible implementation in this area include:

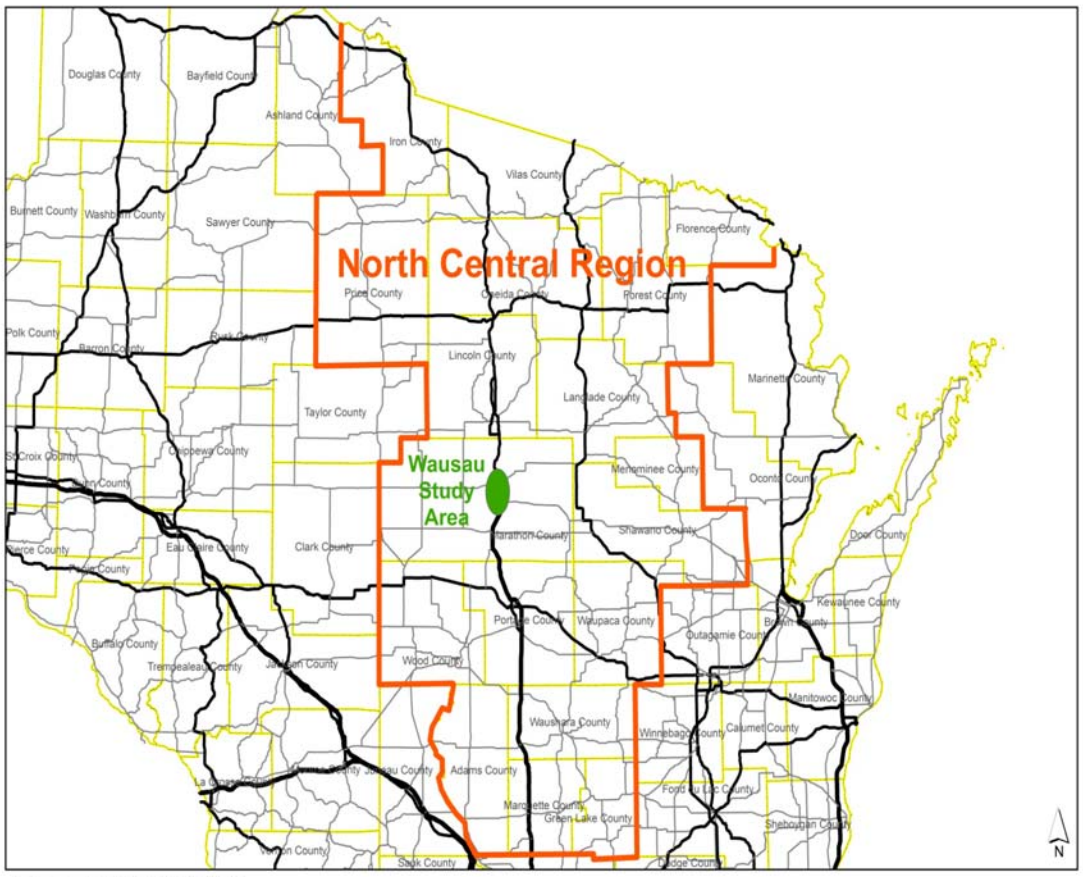
- Closed-circuit television (CCTV) cameras
- System detector stations (SDS)
- Ramp closure gates
- Roadside dynamic message signs (DMS)
- Portable changeable message sign (PCMS) pads
- Crash investigation sites (CIS)
- Law enforcement pads (LEP)
- Fiber optic communications

The analysis used the ITS Deployment Analysis System (IDAS) to determine the benefit/cost (B/C) ratio of the proposed deployment for both present and future traffic conditions. Future traffic conditions were predicted using the Statewide Planning Model. The final benefit/cost ratios may then be used by WisDOT to determine which elements should be considered for deployment.

1.2 PROJECT CORRIDOR

The analysis was performed for the segment of the TOIP "Wisconsin River Corridor" in the Wausau area consisting of USH 51 from Maple Ridge Road (Exit 181) north to CTH WW (Exit 197). The analysis also included spurs of STH 29 extending west from USH 51 approximately 3.4 miles and east from USH 51 approximately 2.8 miles.

Figure 1.1 Proposed Study Area



1.3 CORRIDOR CHARACTERISTICS

WisDOT TOIP corridor description:

- The Wisconsin River Corridor includes a portion of the Madison MPO Region and US 51 from the Michigan border (Ironwood) to Wausau (I-39) and I-39 from Wausau to I-90/94 and I-39/90/94 to Madison (I-94). This 260-mile Corridor is part of a major passenger and freight corridor linking north central Wisconsin and south central Wisconsin and Illinois. It is a critical tourist corridor between the population centers in Illinois and southern Wisconsin to the major recreation areas in the north. It also provides critical economic links for the industrial and commercial communities of Wausau, Wisconsin Rapids, Stevens Point and Marshfield.

According to projections obtained through the Wisconsin Department of Administration, moderate population growth in Marathon County is anticipated in the next 25 years. From 2005 to 2035, a population growth of 23.1% is projected in Marathon County, which slightly exceeds statewide projected population growth. Table 1.1 summarizes population projections for Marathon County and the State of Wisconsin. Table 1.2 presents projected traffic growth in the corridor.

Table 1.1 Population Projections for Marathon County

	Population				Growth
County	2005	2015	2025	2035	2005 to 2035
Marathon	131,705	142,409	153,519	162,078	23.1%
State of Wisconsin	5,589,920	5,988,420	6,390,900	6,653,970	19.0%
Marathon County as % of State	2.4%	2.4%	2.4%	2.4%	

Source: State of Wisconsin – Department of Administration

Table 1.2 Traffic Volumes Wausau Area USH 51

Wasuasu Area Traffic Data

USH 51 SB (Read Down)		
Description	2005 AADT	2035 AADT
Start		
North of CTH WW	**8,200**	**14,800**
CTH WW SB Off-Ramp	500	1,000
CTH WW SB On-Ramp	1,800	4,600
CTH WW to CTH K	**9,500**	**18,400**
CTH K SB Off-Ramp	2,200	4,500
CTH K SB On-Ramp	5,800	7,800
CTH K to Bridge Street	**13,100**	**21,700**
Bridge Street SB Off-Ramp	1,900	2,200
Bridge Street SB On-Ramp	5,600	11,000
Bridge Street to Stewart Avenue	**16,800**	**30,500**
Stewart Avenue SB Off-Ramp	4,000	4,000
Stewart Avenue SB On-Ramp	4,200	N/A
Stewart Avenue to STH 29 North	**17,000**	**26,500**
STH 29 North SB Off-Ramp	0	4,000
STH 29 North SB On-Ramp	8,700	4,800
STH 29 North to Mountain Road	**25,700**	**27,300**
Mountain Road SB Off-Ramp	4,400	3,200
Mountain Road SB On-Ramp	1,700	11,200
Mountain Road to CTH N	**23,000**	**35,300**
CTH N SB Off-Ramp	2,200	3,100
CTH N SB On-Ramp	7,700	11,000
CTH N to STH 29 South	**28,500**	**43,200**
STH 29 South SB Off-Ramp	12,700	16,300
STH 29 South SB On-Ramp	2,200	5,600
STH 29 South to Business 51	**18,000**	**32,500**
Business 51 SB Off-Ramp	4,400	10,700
Business 51 SB On-Ramp	4,800	4,300
Business 51 to Maple Ridge Road	**18,400**	**26,100**
Maple Ridge Road SB Off-Ramp	4,200	4,400
Maple Ridge Road SB On-Ramp	800	2,300
South of Maple Ridge Road	**15,000**	**24,000**
End		

USH 51 NB (Read Up)		
Description	2005 AADT	2035 AADT
End		
North of CTH WW	**8,200**	**14,800**
CTH WW NB On-Ramp	700	1,200
CTH WW NB Off-Ramp	4,300	5,200
CTH K to CTH WW	**11,800**	**18,800**
CTH K NB On-Ramp	2,000	4,400
CTH K NB Off-Ramp	4,600	7,100
Bridge Street to CTH K	**14,400**	**21,500**
Bridge Street NB On-Ramp	1,600	2,300
Bridge Street NB Off-Ramp	5,800	8,400
Stewart Avenue to Bridge Street	**18,600**	**27,600**
Stewart Avenue NB On-Ramp	5,200	5,200
Stewart Avenue NB Off-Ramp	4,800	6,200
STH 29 North to Stewart Avenue	**18,200**	**28,600**
STH 29 North NB On-Ramp	0	3,400
STH 29 North NB Off-Ramp	8,900	12,700
Mountain Road to STH 29 North	**27,100**	**37,900**
Mountain Road NB On-Ramp	4,600	3,600
Mountain Road NB Off-Ramp	2,900	4,400
CTH N to Mountain Road	**25,400**	**38,700**
CTH N NB On-Ramp	2,100	3,900
CTH N NB Off-Ramp	6,600	10,700
STH 29 South to CTH N	**29,900**	**45,500**
STH 29 South NB On-Ramp	14,400	18,300
STH 29 South NB Off-Ramp	2,500	3,900
Business 51 to STH 29 South	**18,000**	**31,100**
Business 51 NB On-Ramp	4,200	10,200
Business 51 NB Off-Ramp	4,700	5,100
Maple Ridge Road to Business 51	**18,500**	**26,000**
Maple Ridge Road NB On-Ramp	4,200	4,700
Maple Ridge Road NB Off-Ramp	700	2,700
South of Maple Ridge Road	**15,000**	**24,000**
Start		

1.4 TOIP RECOMMENDATIONS

The TOIP recommends ITS deployment density classes for a given segment of roadway. The deployment density classes, ranging from baseline to high, were identified based on a variety of operational performance measures including traffic volumes and patterns, safety, weather impacts and special events. The TOIP Spectrum of Deployment Density provides planners and designers with a range of ITS options for each deployment density class. The Spectrum of Deployment Density charts as presented in the WisDOT TOIP are shown in Appendix A.

The Wisconsin River Corridor has recommended ranges from baseline to high deployment densities. In the Wausau area, a medium deployment density is recommend by the TOIP as shown in Figure 1.2 and Figure 1.3. The TOIP deployment intensity recommendations include high level detection and surveillance. Further details on the recommendations of the TOIP can be found on the project's website: http://www.topslab.wisc.edu/workgroups/toip.html.

Figure 1.2 Wisconsin River Corridor (Part 1) TOIP Recommendations

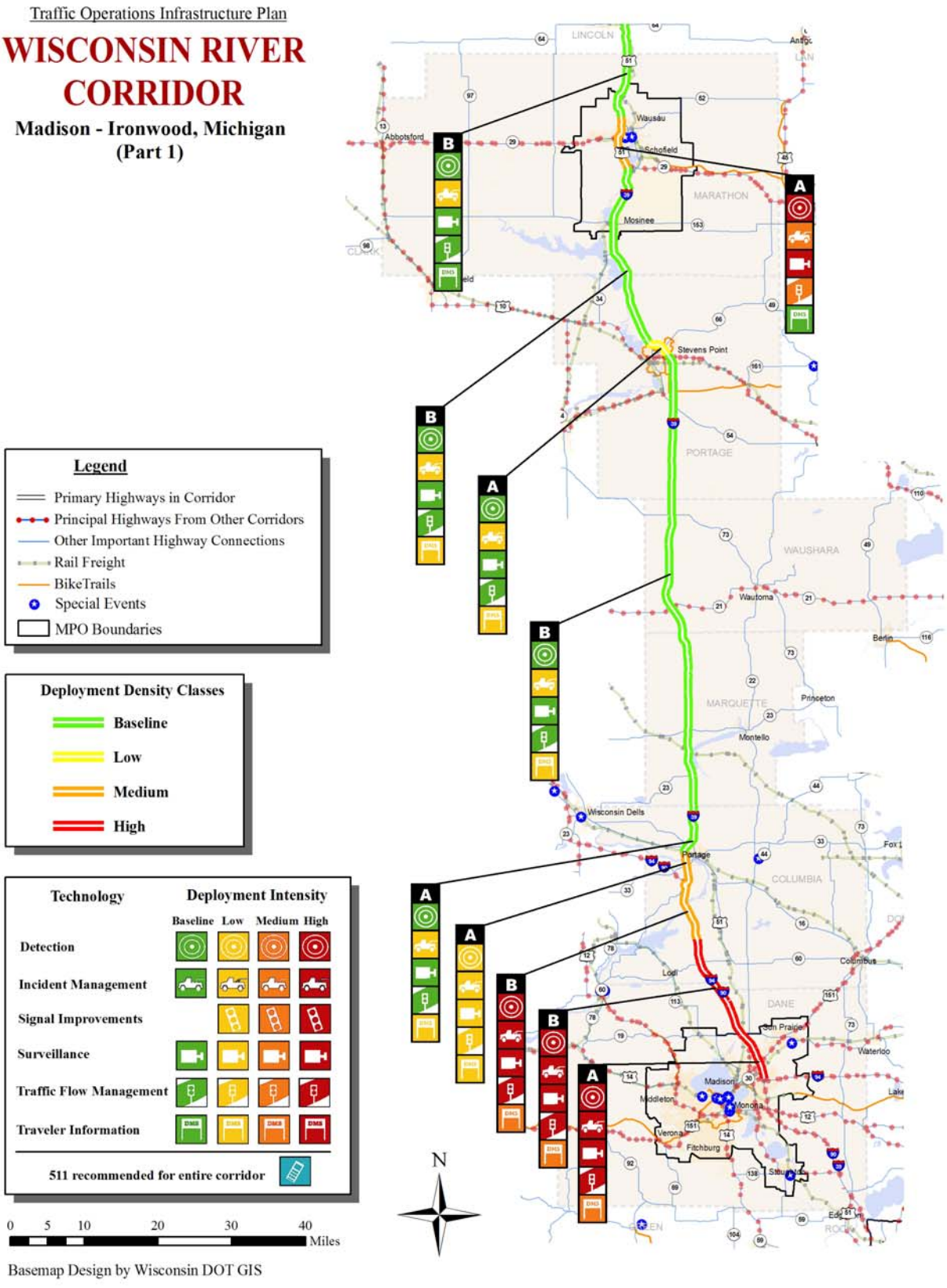
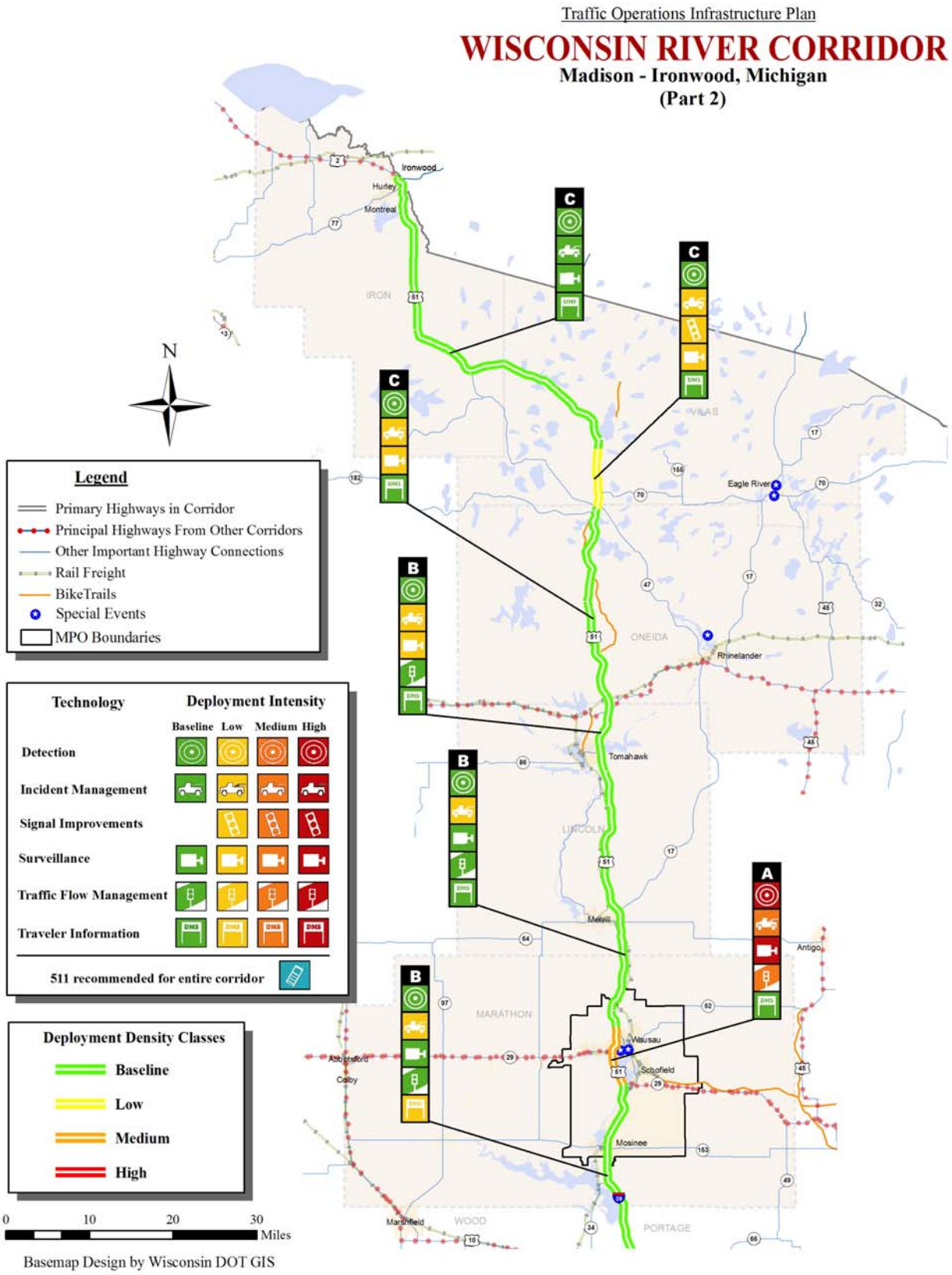


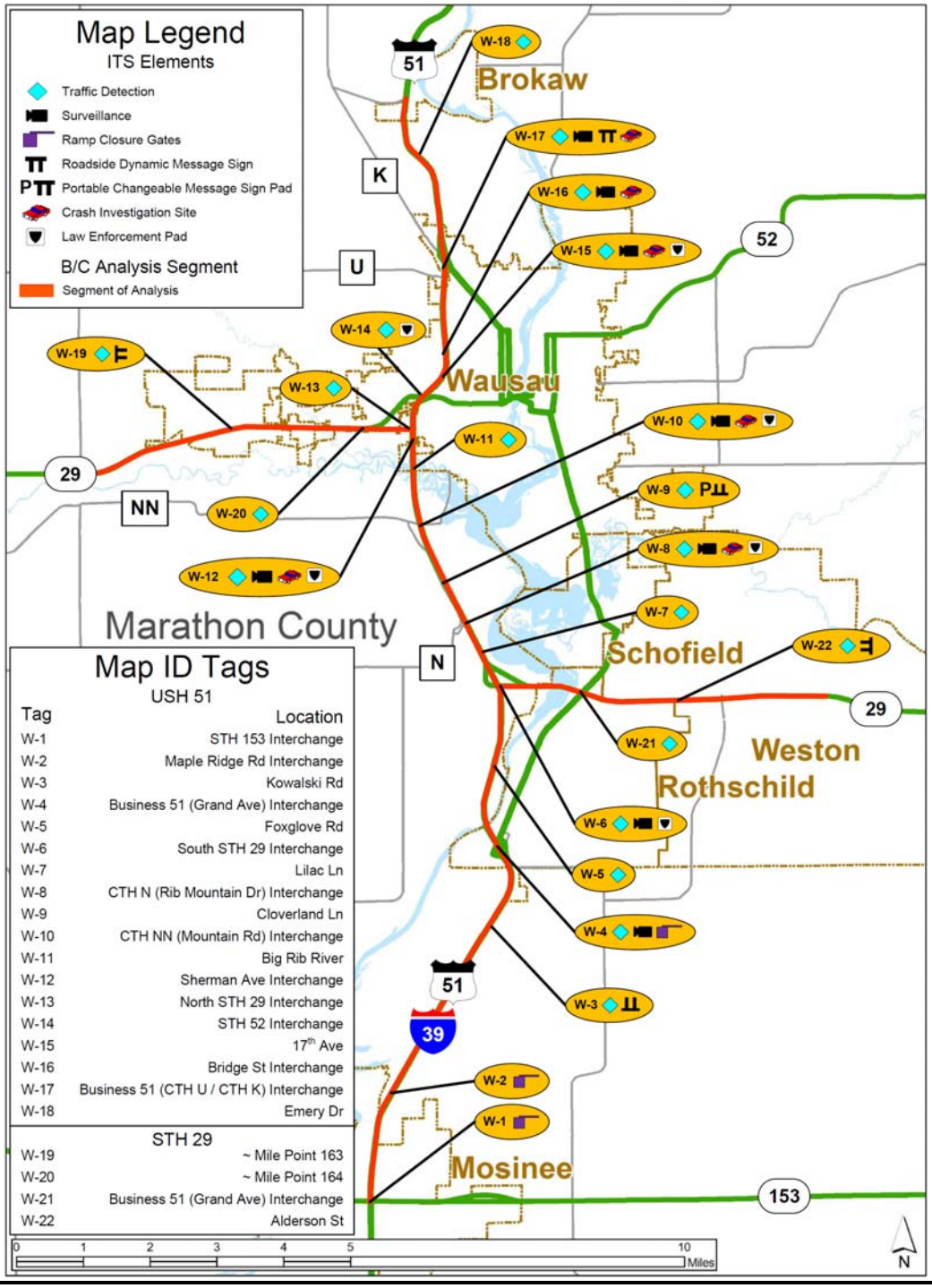
Figure 1.3 Wisconsin River Corridor (Part 2) TOIP Recommendations



2.0 Description of Alternative

In order to determine the benefit/cost ratio for the proposed ITS deployment, the scenario presented in Figure 2.1 was analyzed.

Figure 2.1 Proposed Wausau Area ITS Deployments



2.1 COST ASSUMPTIONS

Initial capital costs, annual operations and maintenance costs and useful lives were assigned to each ITS element based on information from the IDAS database, project experience, the TOIP and the Research and Innovative Technology Administration of the USDOT. A summary of this information along with quantities is presented in Table 2.1.

Table 2.1 ITS Capital Cost Assumptions and Quantities

ITS Element	Capital Cost (2007 Dollars)	Annual Operations & Maintenance Cost (2007 Dollars)	Estimated Life	Quantity	Cost Assumption Source
Traffic Detection - Mainline	$14,500	$500	10	20	2 detectors (current Wausau area deployment)
CCTV Surveillance	$40,000	$2,300	10	8	TOIP Appendix A – Traffic Management and Surveillance Operations Infrastructure Plan and Cost Estimates, Derived*
Ramp Closure Gate (Vertical Drop)	$19,000	$1,900	10	6	Per WisDOT direction
Roadside Dynamic Message Sign	$83,000	$9,400	10	4	Derived*
Portable Changeable Message Sign Pad Only	$7,000	$0	10	1	Derived*
Crash Investigation Site (Alternative funding assumed)	$0	$0	20	12	N/A
Law Enforcement Pad (Alternative funding assumed)	$0	$0	20	6	N/A
Fiber Optic Communications (per mile)	$54,000	$1,100	20	21 miles	Derived*

*Derived: Determined from ITS and Transportation Project Experience

2.2 BENEFIT ASSUMPTIONS

In calculating benefits, there are several key inputs to the IDAS modeling effort. IDAS utilizes regional travel demand models as the basis of the benefit/cost analysis. A description of IDAS may be found in Appendix C. In this study, the WisDOT Statewide Planning Model for 2005 and 2035 was used to evaluate the ITS deployments being implemented in Wausau. Due to the size and resource requirements of the statewide model, the IDAS analysis was conducted using a spreadsheet technique, rather than by actually running the network model. It should be noted that this technique does not incorporate analysis of air quality benefits. While these benefits are generally a very small proportion of the total, the benefits of this proposed deployment may be slightly underestimated.

Both costs and benefits were calculated for a base year of 2005 and a future year of 2035. An annual adjustment rate of 5 percent was used and the costs and benefits are presented in 2007 dollars.

IDAS requires benefit parameters to estimate the impacts of various deployments. While IDAS includes default parameters based on national studies it also can accommodate information from other sources. In this project several sources were used, including national defaults, the results of customer surveys conducted in Michigan and Ohio and the results of research conducted for this project and a similar project conducted on the US-41 corridor in WisDOT's Northeast Region. The parameters used in this analysis are shown in Table 2.2.

Table 2.2 Comparison of Impact Parameters Used for IDAS Analysis

Deployment	Benefit	Parameter
Freeway Management System (DMS, CCTV, Detection)[b]	% of drivers who divert.	25%
	% of time useful information is provided.	5%
	Estimated time saved.	5 minutes
Additional Benefits from Detection and Surveillance Deployment	Incident duration reduction.	1%
	Fuel consumption reduction.	1%
	Fatality reduction.	1%
	Emissions reduction.	1%
Freeway Service Patrols[a]	Reduction in incident duration.	5%
	Reduction in fuel consumption.	1%
	Reduction in fatality rate.	1%
Ramp Closure Gates[d]	Crash reduction – Fatality.	80%
	Crash reduction – Injury.	80%
	Crash reduction – PDO.	80%
	Reduced operating costs through reduction in police presence.	$50/hour
	PCT of time gate closed (28 hours/year).	0. 30%
Crash Investigation Sites[c]	Reduction in incident duration.	5%
	Reduction in fuel consumption.	1%
	Reduction in fatality rate.	1%
Law Enforcement Pads[d]	Crash reduction – Fatality.	17%
	Crash reduction – Injury.	7%
	Crash reduction – PDO.	5%
	Travel time reduction.	-5%
	% of time pad occupied.	2%

[a] IDAS defaults modified based on initial runs.
[b] Based on Ohio and Michigan customer survey data.
[c] Used same parameters as Freeway Service Patrols – no research found.
[d] *Desktop Reference for crash Reduction Factors* Report No. FHWA-SA-07-015, Federal Highway Administration, U.S. DOT, September, 2007, p.89.

Once benefit parameters were calculated, they were monetized in order to permit direct comparison of the various benefits categories. Although IDAS contains default economic parameters, WisDOT provided a set of economic parameters in a recently issued draft of the WisDOT *Traffic Guidelines Manual, 16-20-70, Financial Assumptions for Engineering Economic Analysis*, January 2008. WisDOT also provided a second resource: *Transportation Engineering Economic Analysis Manual, Chapter 3 Valuation of Costs and Benefits, Topic 1 Financial Assumptions and Parameters, Draft #1E* September 19, 2008. These parameters were incorporated into the analysis and are shown in Table 2.3. All dollar values used in the analysis are in 2007 dollars, in order to facilitate comparison of alternatives across different years.

Table 2.3 Economic Parameters

General Parameters	Value
Number of travel days in a year	286
Year of dollar values	2007
Discount rate	5%
Average vehicle occupancy	1.25
Value of Time (Dollars per Hour)	
Value of in-vehicle time	$9.14
Value of in-vehicle time (commercial)	$20.44
Value of out-vehicle time (commercial)	$20.44
Value of out-vehicle time	$9.14
Value of reduced delay time	$9.14
Fuel costs (gallon)	$2.79
Emission Cost (Dollars per Ton)	
HC/ROG	$2,529.30
NOX	$5,319.51
CO	$5,544.78
PM_{10}	$15,777.47
CO_2	$5.08
SO_2	$5.08
GW	$0.00
Accident Cost (Dollars per Accident)	
Fatality	$4,092,800
Injury	$48,576
Property damage	$2,251
Operating Costs	
Fuel costs (gallon)	$2.79
Nonfuel operating costs (dollars per mile)	$0.09
Noise damage Costs (dollars per mile)	$0.009

3.0 Results of Analysis

This section includes maps and descriptions of the deployment alternative evaluated along with the results of the IDAS analysis. The financial results of the benefit/cost analysis are presented in both graphic and tabular format. Monetized benefits and costs are presented on an annual basis. As mentioned above, the benefit/cost analysis is developed by monetizing different types of benefits including travel time savings in vehicle-hours of travel, reduction in accidents, and fuel cost savings. These benefit measures are presented in tabular format and are expressed as daily totals.

3.1 NORTH CENTRAL REGION

The benefit/cost results for the North Central region ITS deployment in the Wausau area are shown graphically in Figure 3.1 and in tabular format in Table 3.1. The base year 2005 analysis indicates a positive benefit/cost ratio of 8.2 and just under $2.5 million annually in net benefits on an initial investment of about $2.1 million. By 2035 the benefit/cost ratio increases to over 12, with an annual net benefit of over $3.8 million. In the base year the monetized benefits are relatively evenly split with $720,000 in travel time benefits, $770,000 in operating costs and $1.27 million in accident reduction.

By 2035, benefits are split in a proportion similar to 2005 with $1.19 million in travel time benefits, $1.15 million in operating costs and $1.86 million in accident reduction. A large portion of the initial capital cost is in the fiber optic system, which has a long useful life, thus a relatively low annualized cost. Annualized costs remain roughly the same in constant dollars throughout the period. As mentioned earlier the analysis methodology used did not allow estimation of environmental benefits, but these are less significant than the other factors. Performance Impacts are presented in Table 3.2.

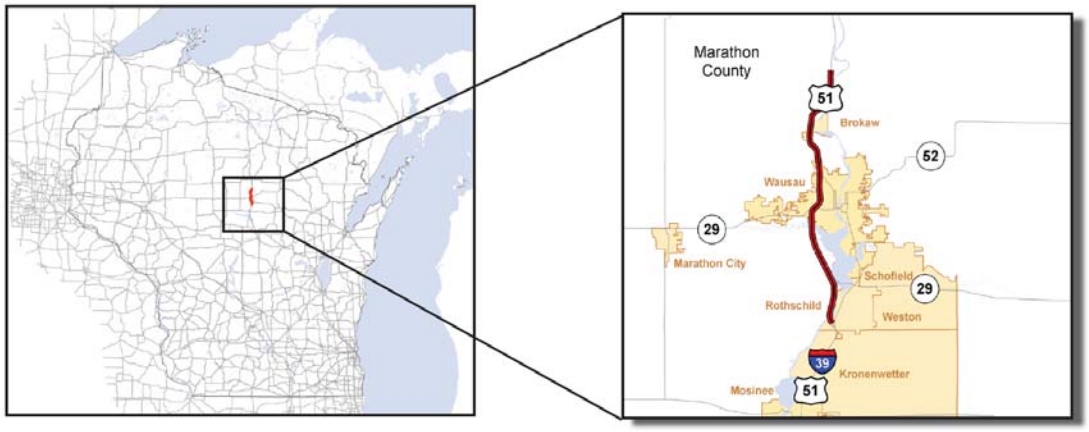
Figure 3.1 Wausau Area IDAS Results Summary

Wausau - IDAS Results

Wausau Area

Description

Wausau area ITS deployments are concentrated on I-39/U.S.51 between the STH-153 Interchange in Mosinee to the south and the County Road K interchange in Brokaw to the north. There are also deployments along STH-29 from the I-39/U.S.51 interchange west to the STH-107 interchange at Marathon City. Deployments include CCTV and detection, along with both permanent DMS and portable CMS. Ramp closure gates, crash investigation sites, and law enforcement pads are also included. Fiber optic communications will be installed to link all electronic devices.



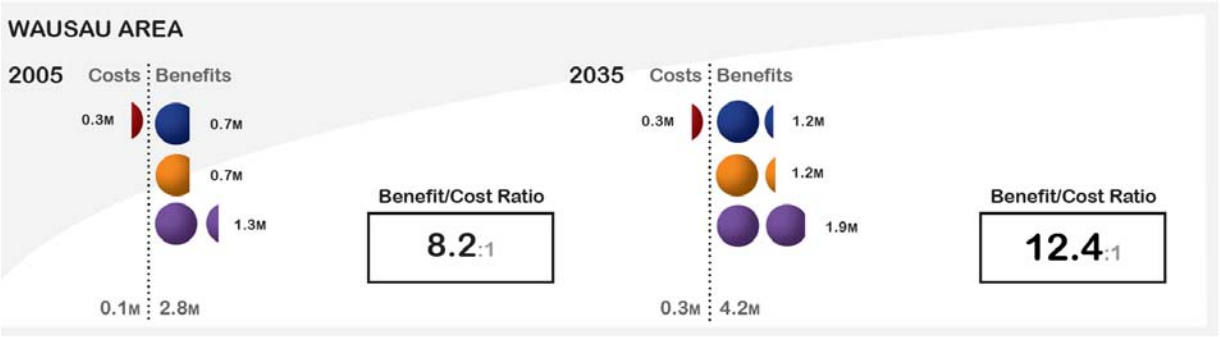


Table 3.1 2005 and 2035 Monetized Benefits

Deployments	Travel Time	Accident Reduction	Operating Cost	Environmental	Total	Annualized Cost	O&M Costs	Initial Capital	Net Benefits	B/C Ratio
Wausau 2005	$727,000	$1,270,000	$773,000	$0	$2,770,000	$338,000	$97,573	$2,133,010	$2,432,000	8.2
Wausau 2035	$1,191,000	$1,860,000	$1,150,000	$0	$4,201,000	$338,000	$97,573	$2,133,010	$3,863,000	12.4

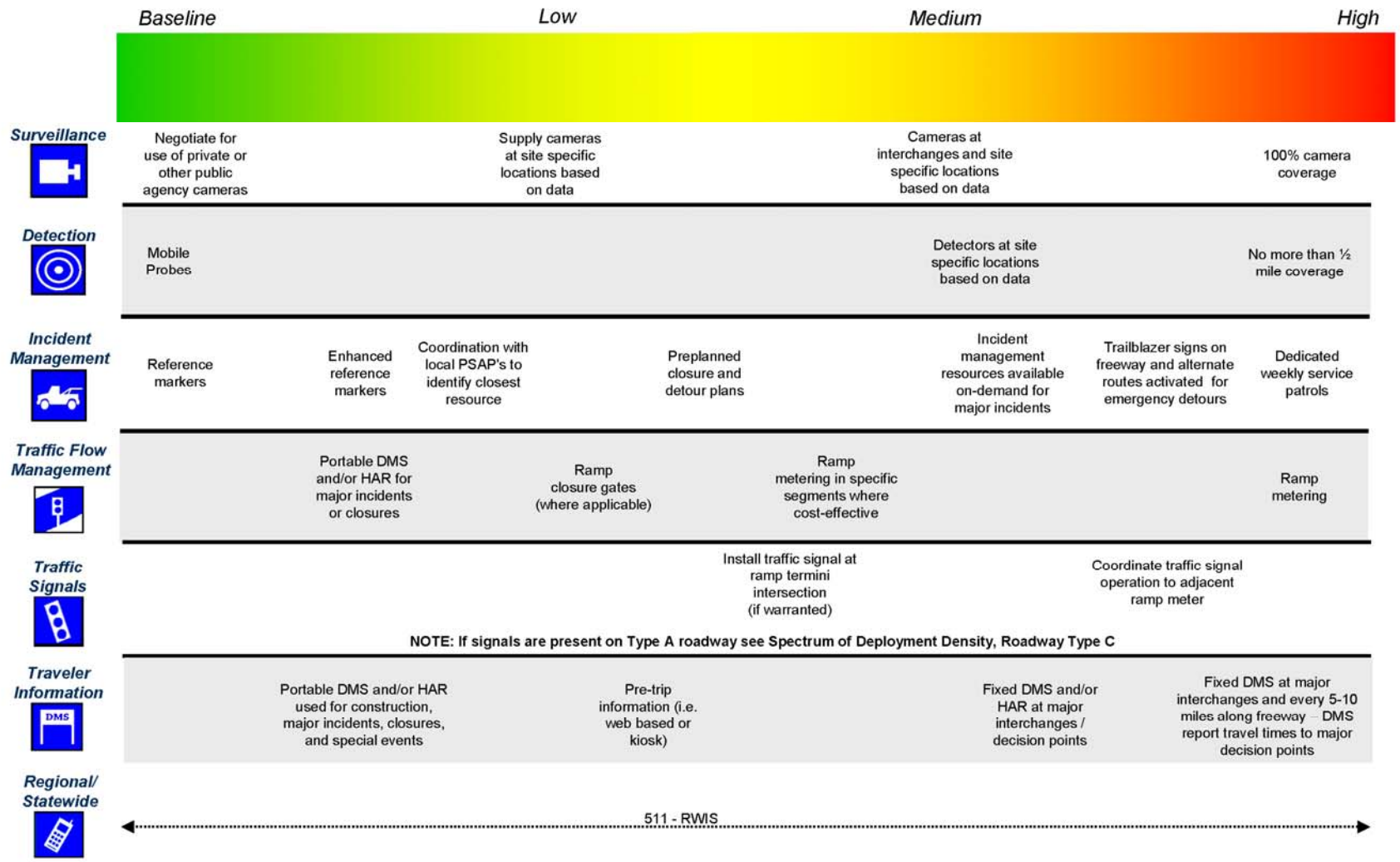
All values are dollars per year except Initial Capital Cost

Table 3.2 2005 and 2035 Performance Impacts

	Wausau	
	2005	**2035**
Change in VMT	0	0
Baseline VMT	1,024,800	1,488,201
Improvement VMT	1,024,800	1,488,201
ATIS Savings (hours)	132.03	195.18
Baseline Delay (hours)	72.09	347.61
Improved Delay (hours)	68.65	320.81
Delay Reduction	-3.44	-26.80
Baseline Fatalities	0.018139	0.026341
Improved Fatalities	0.017585	0.025528
Fatality Reduction	-0.00055367	-0.0008128
Baseline Injuries	1.741136	2.528454
Improved Injuries	1.728848	2.510552
Injury Reduction	-0.012287299	-0.017901295
Baseline Fuel	52,313.60	75,959.32
Improved Fuel	51,602.94	74,901.28
Fuel Reduction	-710.66369	-1058.03879
Baseline HC/ROG (tons)	0.00	0.00
Improved HC/ROG (tons)	0.00	0.00
HC/ROG Reduction	0	0
Baseline NO_x (tons)	0.00	0.00
Improved NO_x (tons)	0.00	0.00
NO_x Reduction	0	0
Baseline CO (tons)	0.00	0.00
Improved CO (tons)	0.00	0.00
CO Reduction	0	0

A. Spectrum of Deployment Density

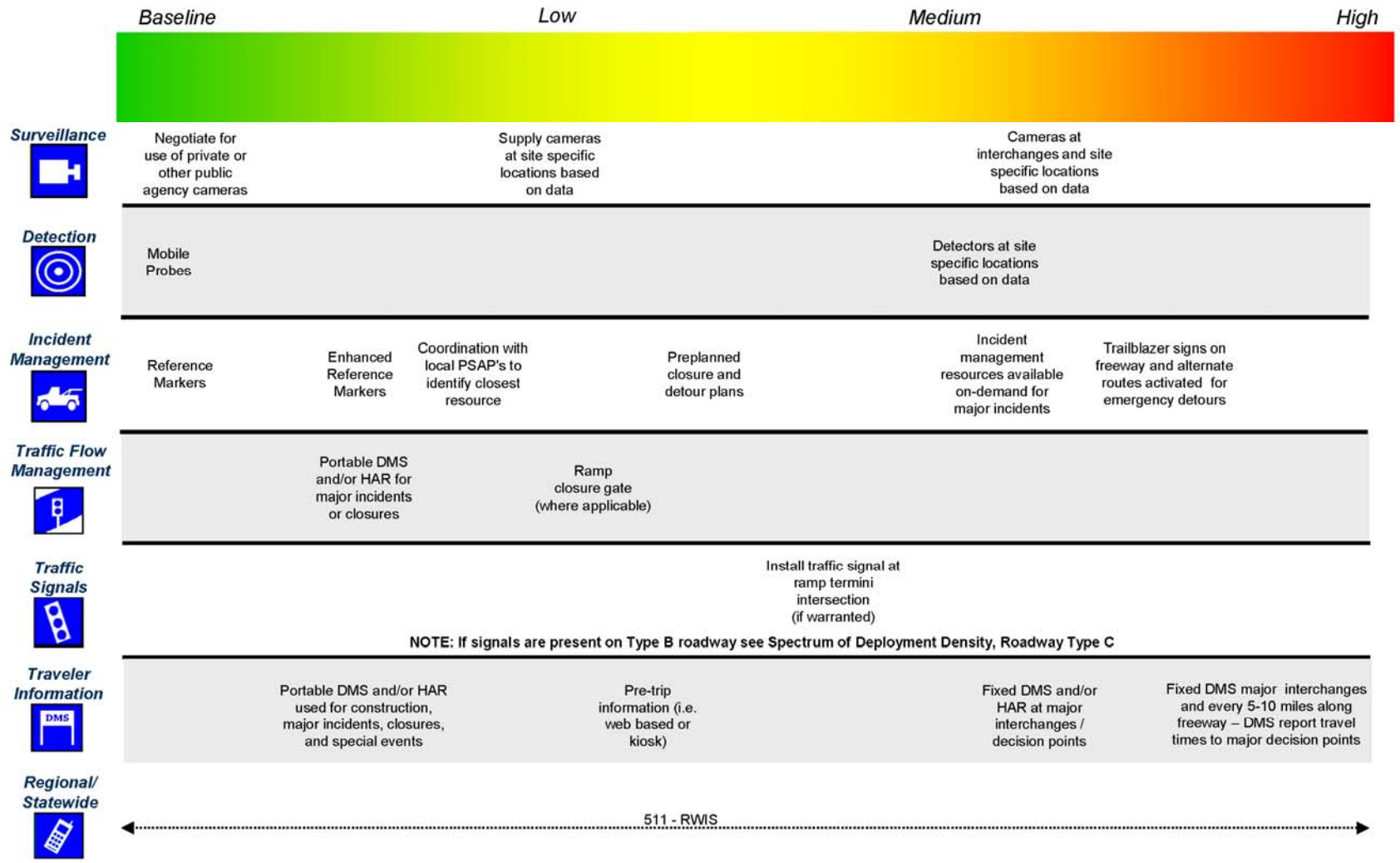
Figure A.1 Spectrum of Deployment Density (Roadway Type A)



Spectrum of Deployment Density

Roadway Type A – Urban Interstate/Expressway

Figure A.2 Spectrum of Deployment Density (Roadway Type B)



Spectrum of Deployment Density
Roadway Type B – Rural Interstate/Expressway

B. Wausau Area ITS Elements

Wausau Area ITS Elements

Approximate Corridor Capital Cost
$2,197,000
Approximate Corridor Annual O & M Cost
$100,500

ITS Component	Map ID	Roadway	At	Category	Type	Capital Cost	Annual O & M	Note
Traffic Detection	W-3	USH 51	Kowalski Road	New		$14,500	$500	
	W-4	USH 51	Business 51 (Grand Ave)	New		$14,500	$500	
	W-5	USH 51	Foxglove Road	New		$14,500	$500	
	W-6	USH 51	South Junction of STH 29	New		$14,500	$500	
	W-7	USH 51	Lilac Lane (approx. MM 187.5)	Existing		$14,500	$500	
	W-8	USH 51	CTH N	New		$14,500	$500	
	W-9	USH 51	Cloverland Lane	New		$14,500	$500	
	W-10	USH 51	CTH NN	New		$14,500	$500	
	W-11	USH 51	Big Rib River	New		$14,500	$500	
	W-12	USH 51	Sherman Ave	New		$14,500	$500	
	W-13	USH 51	North Junction of STH 29	New		$14,500	$500	
	W-14	USH 51	STH 52	New		$14,500	$500	
	W-15	USH 51	17th Ave (approx. MM 192.5)	Existing		$14,500	$500	
	W-16	USH 51	Bridge Street	New		$14,500	$500	
	W-17	USH 51	CTH U/CTH K/Business 51	New		$14,500	$500	
	W-18	USH 51	Emery Drive	New		$14,500	$500	
	W-19	STH 29	MM 163	New		$14,500	$500	
	W-20	STH 29	MM 164	New		$14,500	$500	
	W-21	STH 29	Business 51 (Grand Ave)	New		$14,500	$500	
	W-22	STH 29	Alderson St	New		$14,500	$500	

ITS Component	Map ID	Roadway	At	Category	Type	Capital Cost	Annual O & M	Note
CCTV Surveillance Camera	W-4	USH 51	Business 51 (Grand Ave)	New		$40,000	$2,300	
	W-6	USH 51	South Junction of STH 29	New		$40,000	$2,300	
	W-8	USH 51	CTH N	New		$40,000	$2,300	
	W-10	USH 51	CTH NN	Existing		$40,000	$2,300	
	W-12	USH 51	Sherman Ave	New		$40,000	$2,300	
	W-15	USH 51	17th Ave (approx. MM 192.5)	New		$40,000	$2,300	
	W-16	USH 51	Bridge Street	New		$40,000	$2,300	
	W-17	USH 51	CTH U/CTH K/Business 51	New		$40,000	$2,300	

ITS Component	Map ID	Roadway	At	Category	Type	Capital Cost	Annual O & M	Note
Ramp Closure Gates	W-1	USH 51	STH 153 Ramp to NB USH 51	New	Vertical Drop Gate	$19,000	$1,900	per WisDOT direction
	W-1	USH 51	STH 153 Ramp to SB USH 51	New	Vertical Drop Gate	$19,000	$1,900	
	W-2	USH 51	Maple Ridge Rd Ramp to NB USH 51	New	Vertical Drop Gate	$19,000	$1,900	
	W-2	USH 51	Maple Ridge Rd Ramp to SB USH 51	New	Vertical Drop Gate	$19,000	$1,900	
	W-4	USH 51	Business 51 Ramp to NB USH 51	New	Vertical Drop Gate	$19,000	$1,900	
	W-4	USH 51	Business 51 Ramp to SB USH 51	New	Vertical Drop Gate	$19,000	$1,900	

ITS Component	Map ID	Roadway	At	Category	Type	Capital Cost	Annual O & M	Note
Traffic Signal Improvements	N/A	USH 51	CTH N	Upgrade	Interchange	$0	$0	Signal Upgrades not included in B/C analysis
	N/A	USH 51	CTH NN	Upgrade	Interchange	$0	$0	
	N/A	USH 51	Bridge Street	Upgrade	Interchange	$0	$0	
	N/A	USH 51	CTH U/CTH K/Business 51	Upgrade	Interchange	$0	$0	

ITS Component	Map ID	Roadway	At	Category	Type	Capital Cost	Annual O & M	Note
Roadside DMS	W-3	NB USH 51	Kowalski Road	New	Roadside	$83,000	$9,400	
	W-17	SB USH 51	CTH U/CTH K/Business 51	New	Roadside	$83,000	$9,400	
	W-19	EB STH 29	MM 163	New	Roadside	$83,000	$9,400	
	W-22	WB STH 29	Alderson St	New	Roadside	$83,000	$9,400	

ITS Component	Map ID	Roadway	At	Category	Type	Capital Cost	Annual O & M	Note
PCMS pad	W-9	NB USH 51	Cloverland Lane	New	Pad	$7,000	$0	

Non-ITS Component	Map ID	Roadway	At	Category	Type	Capital Cost	Annual O & M	Note
Crash Investigation Site	W-8	USH 51	CTH N	New	NB	$0	$0	Alternative funding assumed
	W-8	USH 51	CTH N	New	SB	$0	$0	
	W-10	USH 51	CTH NN	New	NB	$0	$0	
	W-10	USH 51	CTH NN	New	SB	$0	$0	
	W-12	USH 51	Sherman Ave	New	NB	$0	$0	
	W-12	USH 51	Sherman Ave	New	SB	$0	$0	
	W-15	USH 51	17th Ave (approx. MM 192.5)	New	NB	$0	$0	
	W-15	USH 51	17th Ave (approx. MM 192.5)	New	SB	$0	$0	
	W-16	USH 51	Bridge Street	New	NB	$0	$0	
	W-16	USH 51	Bridge Street	New	SB	$0	$0	
	W-17	USH 51	CTH U/CTH K/Business 51	New	NB	$0	$0	
	W-17	USH 51	CTH U/CTH K/Business 51	New	SB	$0	$0	

Non-ITS Component	Map ID	Roadway	At	Category	Type	Capital Cost	Annual O & M	Note
Law Enforcement Pad	W-6	USH 51	South Junction of STH 29	New		$0	$0	Alternative funding assumed
	W-8	USH 51	CTH N	New		$0	$0	
	W-10	USH 51	CTH NN	New		$0	$0	
	W-12	USH 51	Sherman Ave	New		$0	$0	
	W-14	USH 51	STH 52	New		$0	$0	
	W-15	USH 51	17th Ave (approx. MM 192.5)	New		$0	$0	

ITS Component	Map ID	Roadway	At	Category	Distance (miles)	Capital Cost	Annual O & M	Note
Fiber Optic Communications	N/A	USH 51	USH 51	New	19	$1,026,000	$20,900	Not shown on map
	N/A	USH 51	STH 29	New	2	$108,000	$2,200	Not shown on map

C. IDAS Description

IDAS Description

This section presents a brief overview of the ITS Deployment Analysis (IDAS) system software used to conduct the benefit/cost analysis for this project. More detail on IDAS can be found at http://idas.camsys.com/. The tool being used in the evaluation is the. This software package was used to conduct the benefit-cost analysis of ITS alternatives. IDAS is a sketch-planning software and analysis methodology developed by Cambridge Systematics for the Federal Highway Administration (FHWA).

IDAS was developed to assist state, regional and local agencies in integrating ITS into the transportation planning process. Planners and others can use IDAS to calculate relative costs and benefits of ITS investments. IDAS currently can predict costs, benefits and impacts for more than 60 types of ITS investments in combination or isolation.

In order to be consistent with current transportation planning processes, IDAS operates as a postprocessor to travel demand models used by Metropolitan Planning Organizations (MPO) and by state Departments of Transportation (DOT). Although IDAS is a sketch-planning tool, it can implement the modal split and/or traffic assignment steps associated with a traditional planning model. These steps are key to estimating the changes in modal, route and temporal decisions of travelers resulting from ITS technologies. For this analysis, the Statewide Planning Model was utilized. Since this model was developed as part of a statewide model development effort, the methodology used is consistent.

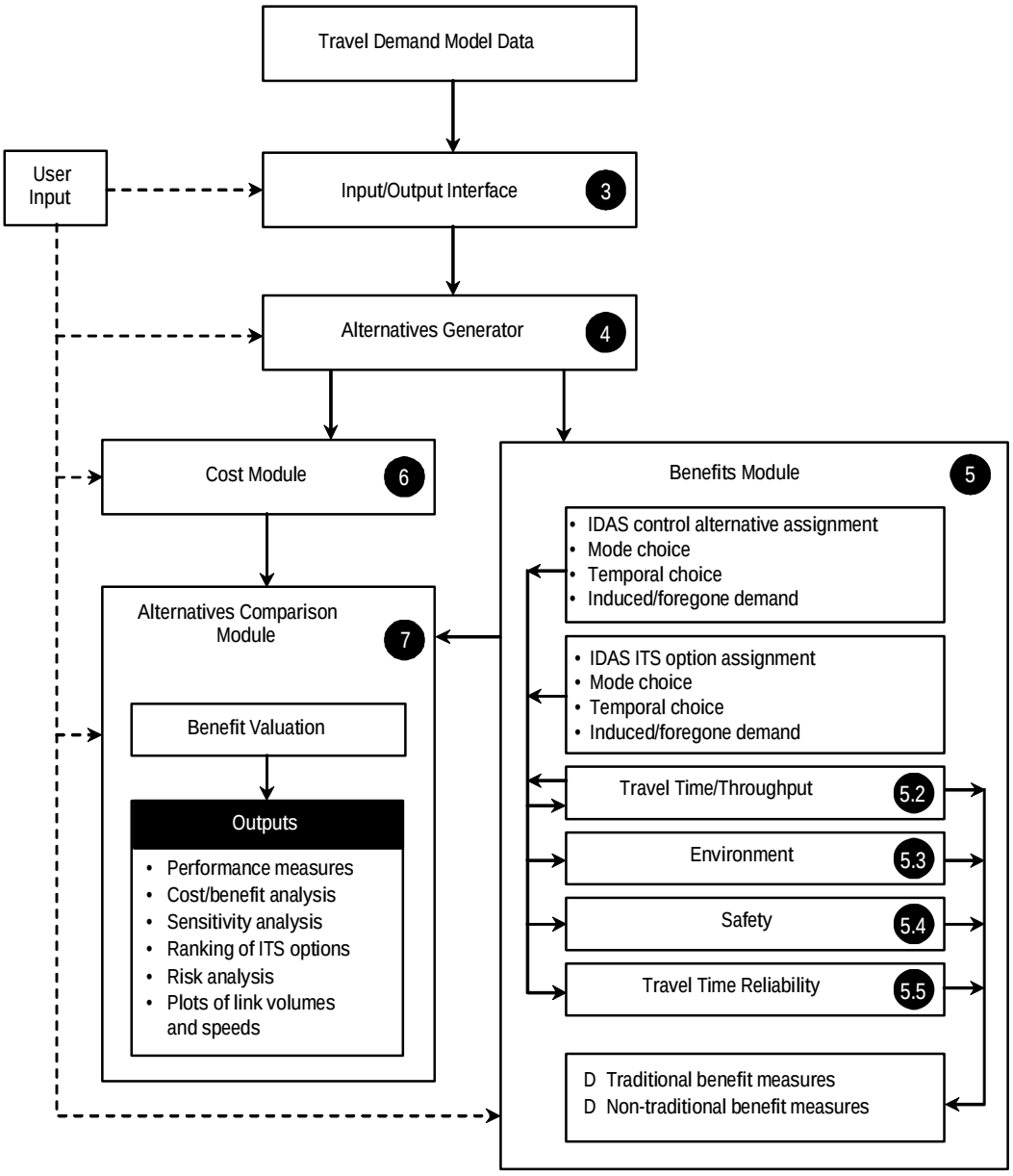
There are a wide range of ITS improvements that can be assessed in IDAS, including Freeway Management Systems, Advanced Public Transit Systems, Incident Management, Emergency Management, Advanced Traveler Information Systems and many others. The set of impacts evaluated by IDAS included changes in user mobility, travel time/speed, travel time reliability, fuel costs, operating costs, accident costs, emissions and noise. The performance of selected ITS options can be viewed by market sector, facility type and district. IDAS is comprised of the following five different analysis modules:

- Input/output interface module (IOM)
- Alternatives generator module (AGM)
- Benefits module
- Cost module
- Alternatives comparison module (ACM)

The input/output interface is used to specify and translate the data files provided by the regional travel demand models and convert the data into a format that can be used internally by the IDAS model. The alternatives generator module allows an analyst to use a graphical user interface (GUI) to define and code ITS improvements into IDAS.

IDAS estimates both traditional benefits of ITS deployment, such as, improvement in average travel time and nontraditional benefits, such as reduction in travel time

variability. The cost module allows the user to define the incremental costs of the various ITS deployments being studied, including capital costs and operating and maintenance costs. The user can modify IDAS-supplied default values for the proportion of the costs borne by the public and private sectors. Finally, the alternative comparison module provides the analyst with information regarding the value of user benefits from ITS deployments, the associated costs of the deployments and a comparison of the benefits and costs for different ITS deployment options.



The specific performance measures generated by IDAS include the following:

- Vehicle hours of travel (VHT)
- Average speed

- Person hours of travel (PHT)
- Number of person trips
- Number of accidents
  - Fatality
  - Injury
  - Property damage only
- Travel time reliability (hours of unexpected delay)
- Fuel consumption (gallons)
- Emissions:
  - Hydrocarbon and reactive organic gases
  - Carbon monoxide
  - Nitrous oxides
  - PM_{10}

The IDAS benefit/cost summary, details the results of the benefits valuation (value of time saved, value of accident reductions, etc.), cost analysis of the ITS option, net annual benefit and benefit-cost ratio. These include the following:

- Annual Benefits:
  - Change in user mobility
  - Change in user travel time (in-vehicle, out-of-vehicle and travel time reliability)
  - Change in costs paid by users (fuel costs, nonfuel operating costs and accident costs – internal only)
  - Change in external costs (accident costs – external only, HC/ROG, NO_x, CO, PM_{10}, CO_2, global warming, noise, other mileage-based external costs and other trip-based external costs)
  - Change in public agencies costs (efficiency included)
  - Other calculated benefits
  - User-defined additional benefits
- Annual costs:
  - Average annual private sector costs
  - Average annual public sector costs
  - Net benefit (annual benefit minus annual cost)
  - B/C ratio (annual benefit/annual cost)

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